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The work of erecting Townshend Hall is progressing rapidly, and each day adds its installment to the ever increasing pile. The foundations are now about completed, and the brick work will soon be well under way. It is hoped that the building will be under roof before the severe weather sets in, so that the work may continue, regardless of the elements.

It is with much interest that we watch the gradual completion of this, the future center of the College of Agriculture and Domestic Science. For in the years to come much will depend upon the conveniences and arrangement of the building itself. The equipment and furnishing of the building and the several departments contained therein, can be changed at will, but the arrangement of the building itself must be made now as it will remain. But we have faith to believe that the persons having the work in charge know their business, and are doing all in their power to make Townshend Hall what we hope it

will be—the finest, most modern and best equipped building devoted to agricultural education in this country.

The series of tests in scoring cattle which is being made with the students in agriculture, under the supervision of Prof. Hunt, has been proved by experience, here and elsewhere, to be one of the best methods of study in these branches of livestock husbandry. By the use of the score card the points and characters of the animals are brought before the student in a material way. Then in the tests above spoken of there is included a contest. The student doing the best work in scoring live stock is to receive a prize, as are also those coming in second, third and fourth. In contesting for these prizes the student will, of course, aim to make himself quite familiar with the points of the score card and, as a result, with the animal itself. This method of study has probably reached its climax at Purdue University, where the students take a trip each year of several hundred miles for the purpose of visiting model farms, gardens and stock farms. Upon these trips the student not only sees the different parts of the country, the farms and gardens, but is thrown with and makes the acquaintance of many men who are prominent in many ways. This acquaintance with men of influence does not count for nothing, as we often see, and in many cases it will be the foundation for a successful career.

The College of Agriculture of the Ohio State University aims to be the exponent of the best application of science to agriculture and horticulture. In addition to the direct instruction given to students, it is making a constant practical effort

to improve and elevate the condition of the farmers, gardeners, dairymen and fruit growers of the State of Ohio. It does this work through the agency of the horticultural societies, farmers' institutes, dairy associations and similar organizations.

Only a small percentage of those engaged in the practical operations of the farm, orchard or garden can ever come to the Ohio State University. Hence, the importance and necessity of the College of Agriculture going to them.

The different members of the faculty of the College of Agriculture are always ready to dispense light and information, and will, during the coming winter, take an active part in the various meetings of different agricultural and horticultural societies.

Horticultural Colonies.

I sincerely hope that the obvious advantages of forming horticultural colonies will be widely and rapidly improved. It would correct the unhealthy congestion of our towns and cities, and in no other way can so many be provided with homes, regular employment and good living. By a horticultural colony I mean the association of from 100 to 500 families, in the purchase of a suitably located tract of land, embracing about one acre for each individual. The location, which should be reasonably near some large commercial center, and the purchase of this land should be intrusted to the most capable and honest members of the association. It should be carefully surveyed and divided into a few small lots, centrally located, for the necessary mechanics and merchants, but mainly into areas of from one to ten acres for horticulture. Ample reservations of the best sites should be

made for a school house, town hall and public park. The streets should be embowered with shade trees, and every owner of a lot or garden should be encouraged to beautify and adorn it.

I believe such a co-operative effort would secure a modest but comfortable home for any family that could contribute from \$300 to \$500. If the contribution ranged from \$500 to \$1,000 a proportionately better home could be secured. Some of the advantages of such colonization over the isolated system of taking up a homestead may be summarized as follows:

First.—Less than one-tenth of the land required under the old system would be found abundant.

Second.—It could be far better selected with reference to markets, and more suitable allotments for fruits, garden vegetables, floriculture, nursery, etc., could be made.

Third.—Few draught animals and little expensive machinery would be required.

And, finally, man's social and gregarious instincts would be satisfied.—From address of Prof. William R. Lazenby.

The Columbus Horticultural Society held its regular monthly meeting at Horticultural Hall, Saturday, October 31.

Interesting reports were presented by the various standing committees, and a fine exhibit of chrysanthemums was made. Prof. Stevens, of the Columbus High School, read a paper on "The Weed Fungi of Ohio." Members of Prof. Lazenby's class in Elementary Horticulture, who had just been studying the weeds of the orchard and garden, were especially interested in this paper.

Mr. Green and Mr. Beattie had some instructive facts on the cul-

ture of chrysanthemums. Many interesting botanical and horticultural specimens were exhibited, and the meeting was one of equal pleasure and profit, such as one interested in horticulture could ill afford to miss.

The State Horticultural Society.

The regular annual meeting of the Ohio State Horticultural Society will be held in Athens, Athens County, the second week in December. The executive committee, of which Prof. Lazenby is chairman, is working faithfully to prepare a good program.

Prof. Taylor, of the Division of Pomology of the United States Department of Agriculture, and the Hon. S. D. Willard, the distinguished nurseryman and fruit grower of New York State, will be present and address the meeting.

Among the questions to be considered is the feasibility of holding a national convention of horticulturists for the purpose of considering the best means of preventing the spread of noxious insects and fungous diseases by appropriate State and Federal legislation.

This is a matter of great importance to the horticulturists of the State of Ohio, who have to fight for the fruit they now have, and who do not wish to see their orchards and vineyards invaded by other pests, especially injurious insects and diseases from foreign shores.

NOTES.

Sherman Hood, a graduate of the class of '94 in Horticulture and Forestry, spent a few days at the University during the last week in October. He is now a practical horticulturist in Trumbull County, and in spite of the general depression in all productive industries, reports that he is doing well.

Ernest J. Riggs, of the class of '95, K. C. Egbert, of the class of '90, and Prof. W. B. Alwood, formerly of the Ohio Experiment Station, have each made application for an advanced course of study leading to the degree of Master of Science in Horticulture.

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H. A. Surface, of the class of '91, ex-assistant in the Geological Department, and who has recently held the position of Professor of Natural Science in Napa College, California, is now taking a post-graduate course at Cornell. He is doing special work in entomology and expects to take his master's degree at the end of the college year.

Value of Our Farm Animals.

The United States Department of Agriculture has published a pamphlet which gives the number and value of the farm animals in each of the States and Territories from every year from 1880 to the present time. The total value of farm animals in the United States in 1880 was \$1,576,917,556. In 1890 the value had risen to \$2,418,766,028. The maximum value was reached on January 1, 1893, when the figures were \$2,483,506,681. There has been steady and rapid decrease in values since that time, and on the 1st of January of the present year the total value was only \$1,727,926,084.

The reduction of the three years amounts to \$756,580,600. These are unpleasant figures, but it is an unfortunate fact that there is no exaggeration about them. It is probable that the real falling off in the market value is considerably greater than indicated by the estimates of the Department of Agriculture.

Subscribe for THE STUDENT.

The Care of Farm Horses.

[Taken from "Stephens' Book of the Farm," pp. 392-408.]

The care of the horses should play an important role in the daily routine of every well-managed farm. The farmer himself should look after this matter and see that it is well done. The most satisfactory arrangement, where hired help is used, is to allow the man to have charge of, and drive the same team each day during his engagement. Thus the driver and horses become acquainted with each other's ways, and as a result of this mutual understanding better work may be accomplished with less time and labor than otherwise. Horses which have been raised and trained on the farm, and become accustomed to the ways of their driver, often show a remarkable amount of intelligence in the way in which they perform their work and obey the words of the driver.

In the care and management of the horse cleanliness and method are two prime requisites. In his natural habits the horse is one of the most cleanly of animals and is very particular about what he feeds upon. Therefore he should never be forced by hunger to eat musty or tainted fodders, or grain of any sort which are distasteful or injurious to him. He digests his food very rapidly and in a comparatively short time after eating his stomach is empty, and he is soon hungry, consequently he should be fed regularly and with as nearly equal intervals as possible between feeds. Not only the feeding, but the grooming, watering, etc., should be done at a definite, fixed time each day. They should be given all the pure water they will drink, preferably before eating, for if allowed to drink copiously just after eating, particles of undigested food are liable to be car-

ried into the intestines, and cause trouble, such as colic, etc.

To keep the horse clean and comfortable, the stable must be kept clean and well littered. The stalls should be cleaned each day and thus prevent the manure from collecting in large quantities under the horse's feet. When allowed to remain in the stalls it soon goes through a process of heating and gives off ammonia, which is deleterious to the horse's feet and eyes, besides being often absorbed by the foods, rendering them unpalatable to the animals.

Grooming.—If the horse is to be kept looking sleek and neat, the grooming is fully as important as the feed. When the horses have finished their day's work and been put in the stable for the night, as soon as their coats are dry, they should be thoroughly groomed and dried by rubbing before being left for the night.

Another matter of importance is the exercise of the horses during the winter weather. Many farmers allow their horses to stand in the stables during the cold winter weather without sufficient exercise, and consequently they become soft and flabby and unfit for active work. This should be guarded against by providing a suitable exercise of about two hours each day.

Quarters.—The standard width for a horse stable is eight feet and six inches. The side walls to the ceiling should be at least eight feet high. A low stable is inconvenient as well as unhealthful. Each animal should have not less than 1,000 cubic feet of breathing space, and 1,200 to 1,400 is better.

The stalls should be roomy, not less than six feet wide.

The floor of the stall should be made hard, to resist the action of the horse's feet. Dressed flag-

stones, nicely arranged on a bed of concrete, will be found to make a durable floor. Concrete mixed with crushed iron slag is also often used and makes a floor which has the advantage of wearing rough instead of smooth. The floors of the stalls should have a fall of about three inches from front to gutter.

A sufficient number of windows should be provided to light all parts of the stable. A thorough system of ventilation should be provided, and care should be taken not to have a draught of cold air come directly on the animals. This may be arranged by admitting the fresh air over the tops of the horses' backs and allowing the warm air to escape through openings in the roof.

M. IMES.

Score Card for Dent Corn.

The score card has been used for a number of years in the Agricultural Department of the University as an aid to students in judging different classes of live stock. The success of this method suggested the practicability of using the score card for judging dent corn.

Twenty-five varieties of corn were grown in small plats on the University farm for no other purpose than to give students practice in studying the characteristics of different varieties. Each student in the class is required to study and score carefully each of the twenty-five varieties and place them in order of excellence, just as if he were judging at a fair.

The following scale of points has been adopted:

Dent Corn.—Scale of Points.—

Stalk:

Height—11 feet for Southern, 10 feet for Central, and 9 feet for Northern Ohio.

Circumference between first and second joints, $3\frac{3}{4}$ - $4\frac{1}{4}$ inches, giving

sufficient support to plant without undue coarseness of stalk.

Leaves abundant, indicating growth and adding to the feeding value of the plant.

Husks abundant and moderately adhering for protection of ear against weather and insects.

Barren Stalks—Should be none.

Ears:

Firmness of grains and cob, and of grains on the cob, indicating ripeness and market condition.

Perfection and uniformity of shape of grains, making rows regular and surface of ear smooth and even.

Space between rows should be filled.

Uniformity of color in grains and cobs, indicating trueness to type.

Filling Out at Ends—Ears should be cylindrical and well rounded out at butt and tip.

Per cent. of grain to ear, 85 per cent.

Estimated, —; actual, —.

Length—10 inches in Southern and Central and 9 inches in Northern Ohio.

Circumference, at two-fifths the length, measuring from base, $7\frac{1}{2}$ inches in Southern and Central, and $6\frac{1}{2}$ -7 inches in Northern Ohio.

Juncture of cob with stalk, $\frac{3}{4}$ inch in diameter, giving sufficient support for ear without causing inconvenience in breaking.

Total.

Date.

Student.

It will be noticed that both stalk and ear are considered. In many instances judgment is passed upon a variety of corn simply from an examination of the ear, without reference to the kind of stalk that produced it. The ear is the most important part of the plant, just as the udder is the most important part of a dairy cow. But the careful breeder would hesitate before se-

lecting a cow simply from an examination of the udder without seeing the cow as a whole. Eighty-five points are allowed for the ear and 15 for the stalk, making a total of 100 points for the perfect plant.

Under the heading, "stalk," the height, circumference, leaves, husks and barren stalks are regarded as equally important, and three points each are allowed.

Under the heading, "ears," the firmness of the grains and cob, and of grains on the cob, indicating ripeness and market condition, are regarded as most important, 15 points being allowed. An ear which scored high on all other points would be almost worthless if it were soft and unfit for market. Six points are given to perfection and uniformity of shape of grains, making rows regular and surface of ear smooth and even. In a perfect ear the space or depression between the rows should be filled, giving the maximum amount of grain for a given size of ear; ten points are allowed.

Ten points are also given to uniformity of color of grains and cobs, which indicates trueness to type.

A good ear of corn should be cylindrical and well rounded 'out at butt and tip; ten points allowed. Per cent. of grain to ear and length of ear are both important and are given 10 points each. Eight points are allowed for circumference, which, at two-fifths the length, measuring from the base, should be 7-7½ inches in Southern and Central and 6½ to 7 inches in Northern Ohio. Six points are allowed for juncture of cob with stalk. This should be ¾ of an inch in diameter, giving sufficient support for ear without causing inconvenience in breaking.

By means of the card, our attention is called to the individual features which enter into the make-up

of a perfect ear, and also to the relative importance of each. After the work with the score card is followed persistently for a time one comes to notice all the points carefully and is then prepared to work intelligently without the use of the card.

Draft of Harrows.

The students of the class in farm equipment of the College of Agriculture, under Prof. W. D. Gibbs, have been testing the draught of three requisite implements of the farm, namely, the disk cutaway harrow, the spring tooth harrow and the smoothing harrow.

The results would probably be interesting to some of the farmers. The tests were made on corn ground with the corn stubble removed and harrowed once. The land was level and deep, mucky soil, in fair state of cultivation, though the soil was quite compact from the frequent and heavy rains during the summer. The first test was made with the cutaway disk harrow, it being 6 feet wide, with 12 disks 15 inches in diameter from end of spades. The disks were adjusted to run straight, moving but little soil. With 157 pounds weight on the machine it required a draught of 175 pounds. In the second test the same implement was used, but with the disks adjusted at an angle of about 20 degrees, and with the same conditions in regard to weight and soil. This required 225 pounds of draught, stirring the soil 1½ inches deep and moving approximately 648 cubic inches of soil for every foot advanced. The work was fairly satisfactory with present conditions. In the third test the same implement was again used, but the disks adjusted at their greatest angle—about 40 degrees. The work done this time was far more effective,

stirring the soil at a depth of $2\frac{1}{2}$ inches and leaving the soil in a better tilth.

This time it required a draught of 475 pounds to move about 1,500 cubic inches of soil in every foot the harrow advanced.

The draught of the spring tooth harrow was tested next on the first plot following the work done by the disk harrow in the first test. The harrow, with 18 teeth, took a strip 6 feet 8 inches wide, stirring the soil to a depth of 2 inches, requiring a draught of 375 pounds, moving 864 cubic inches of soil in every foot the harrow advanced. The effectiveness of this implement on the soil was more satisfactory than the second test of the disk. The second test of the spring tooth harrow was made on the ground gone over by the disk in the second test. The work of the implement in this case was greater, although the soil being left in better condition from second test. It was stirred to a depth of $2\frac{1}{2}$ inches, which required a draught of 325 pounds to move about 540 cubic inches of soil to every foot passed over.

The smoothing harrow was then tested, giving it two trials with the teeth set at different angles, going over the same plot. In the first test the teeth were set at an angle of 75 degrees (or almost flat), stirring a strip 7 feet 8 inches wide, 1 inch deep, and required 165 pounds draught to move approximately 294 cubic inches of soil in every foot the harrow advanced. In the second test the teeth were set at an angle of about 15 degrees (or nearly perpendicular), following the work done by the spring tooth harrow in second test and cutaway in third. It stirred the soil to a depth of about $2\frac{1}{2}$ inches, requiring a draught of 215 pounds to move 882 cubic inches of soil in every foot the har-

row passed over. The soil was left fairly mellow and in good condition this time. An extra trial was given the cutaway on a different plot, on which the soil had not previously been touched, under conditions the same as in test third, having the disks at their greatest angle. Crediting it at a depth of 2 inches, it required 475 pounds, the same draught required in test 3, with disk harrow, in which the soil had been harrowed once, but crediting with the depth of 3 inches. The number of cubic inches of soil moved to a foot advanced in this case was 768. In comparing the second test of the disk with the spring tooth, we find the draught of the disk harrow 150 pounds in favor of the spring tooth. Accordingly the spring tooth moved one-third as much soil as was moved by the disk; so in combining the effectiveness and draught it would nearly counterbalance the efficiency of the two implements, in case they perform the work as stated. Now, taking everything into consideration, the draught, the effectiveness and the weight of the man riding in case of the disk harrow (which, by many farmers, is considered a great advantage), the favor seems to fall to the disk. With regard to the smoothing harrow, the draught was light and not very effective, owing to the great angle at which the teeth were set. A similar result was found for the third and fourth tests of the disk and second of the spring tooth.

A brief summary of these tests show that the cutaway, under given conditions, moved more earth for a given amount of draught than either of the other implements, and at the same time left the soil in better condition.

C. W. McCULLOUGH.

Animal Mechanics.

Our domestic animals are so common and so familiar to us that, under ordinary circumstances, we recognize in them nothing more than living beings which can serve the purpose of man in doing work for him when suitably equipped and trained, or which furnish food for him, or which are creatures of companionship to him. Of course, we say the animal must have proper food if he is to serve us in any of these respects and must be in a state of good health. But to know whether one animal is better adapted for a certain service than another, more must be considered than merely if this animal is in a better state of nourishment or health than the other animal. The mechanical structure must be studied.

Domesticated animals, in fact all vertebrate animals, are built, so to speak, on the same general plan. In comparative anatomy, the corresponding parts (bones, muscles, etc.) in a horse, may be traced in a fish. To be sure, the bones and muscles have different shapes in a horse from those in a fish; but they fulfill, in a general way, the same functions in a horse as they do in a fish, although some bones and muscles are found in the horse which cannot be found in the fish, and vice versa. This disagreement is due to the distant relationship of these two animals. This distance of relationship is due to the different circumstances of life: such as living in water or on land; different climate or different kinds of food. Now, in the structure of the domesticated animals, of course there is less difference because they have lived under more similar conditions and eat much the same kind of food. To compare, take the posterior member of a horse and that of a dog. Both of these animals have pelvic

bones, thigh bones, leg bones, bones of the hock, shank bones, and toe or digital bones. This comparison agrees exactly until the shank is reached, where the dog has more bones than the horse, the former having five toes, while the horse has only one toe.

The animal considered mechanically consists of a hard, resisting frame, in the cavities of which lie the vital organs, and outside of which most of the muscles are found. The frame is supported by four jointed limbs, or members, which sustain the entire weight of the body, and any burden placed upon it. In considering the adaptability of an animal for dragging a load or for carrying a burden, the frame work of the animal must be noticed.

By direct experiment it has been found that the center of weight, or center of gravity, of a horse is at a point on the median plane within the animal, back of the attachment of the front limbs and in the lower third of the body from above to below. Now, when a horse walks he changes the point of the center of weight in order to maintain his balance. This change is done by swinging the head to the opposite side from that where a foot is lifted. This is the great mechanical function of the neck and head. We can easily see the result here if the neck be very long and the head heavy, for then the side swinging would not need to be so great to accomplish the same end as when the neck is short and the head small and light. The head and neck are used to change the position of the center of weight, too, when the horse changes his gait from a walk to a trot or run; for then his center of weight is thrown forward and upward in order to make his balance more unstable. There are several

natural directions which the neck may have; as, horizontal, oblique and vertical; or, the neck may be arched or ewe-necked. The direction of the neck decides the direction of the axis of the head. That is to say, if the neck be vertical the head will be horizontal, or if the neck be horizontal the head will be vertical. The reader can decide for himself which case would be the most desirable, or if a mean between these extremes would be more advantageous. In determining the most desirable direction of the head and neck, several things must be considered: (1) The position for the animal to have the best vision; (2) the position to be easiest guided by the bit; (3) the position most favorable for the passage of air through the nostrils.

In the animal mechanism the withers, back, loins and croup should be closely observed. The extent of these regions may be varying in different individuals and one should have an ideal conformation in his mind when he examines a horse for any purpose.

The withers may be high or low, prominent or suppressed. There may be two causes for this: (1) The length and direction of the dorsal spines of the vertebrae; (2) the attachment of the shoulder to the body—that is, whether this attachment is high or low. If the dorsal spines are of a good length, ample space and good attachments will be afforded for muscles of the neck and also for the muscles of the back filling the vertebral groove. Certainly this is desirable and considerable of stress should be put upon the conformation of this region when examining the horse.

The back and loins of the animal constitute the “reach” or “coupling rod,” holding the posterior with the anterior part of the body. The back

and loins transmit the propulsive power from the hind to the front members, and they also sustain the weight of the chest and abdomen.

Since the back and loins fulfill such important functions, it is plain that they should be strong and should possess both properties of rigidity and elasticity. To be strong the region should be slightly curved—arched—that is, the axis of the vertebra should be arched. In the exterior of the horse this arch is obliterated by the varying length of the dorsal spines of the vertebrae, so that the back appears to be straight or even concave. The length of the back should be ample for two reasons: (1) so that the animal will not forge when traveling; (2) so that great chest length will be afforded, for the length of the back measures the chest length. The length of the loins, on the contrary, should be short, for in this region the bones (lumbar vertebrae) have no side support. A good width of loins is considered desirable in all cases.

P. B.

(To be continued.)

New Experiments with Fungicides for the Smut of Oats.

By PROF. W. A. KELLERMAN.

The experiments referred to below were carried on during the past season (1896) on the University farm. Prof. Hunt kindly placed the conveniences of the farm department at my disposal. Both wheat and oats were used, but on account of the small quantity of smut in the wheat and the unsatisfactory crop obtained, no statement will be made in reference to the experiments with wheat. They, however, corroborate, in a general way, the correctness of the results obtained with the oats. A full account and tabulation of the results will be

found in the proceedings of the seventeenth annual meeting of the Society for the Promotion of Agricultural Science. That portion referring to the experiments with oats is here reproduced.

The hot-water method of treatment of seed to prevent the smuts of wheat and oats has, since its introduction by Jensen in 1888, proven thoroughly efficient and entirely satisfactory to experimenters. The favorable results published in the Kansas Experiment Station Bulletin by Mr. Swingle and myself in the year 1889, also in 1890 and 1891, and by Arthur in the Indiana Bulletins, in 1890 and subsequently, have since been corroborated by very many experimenters and by some farmers.

But we have to make the same complaint here that Jensen has already made for Denmark, namely, that comparatively few farmers put the method into practice.

The advantages of applying this treatment are apparent, insuring, as it does, an increase in the crop, not only by replacing the smutted by sound heads (which would, in our region, be a gain generally from 5 to 10 per cent. or more), but also by an extra yield of perhaps 4 or 5 per cent. additional to the increase just mentioned.

The wide distribution of agricultural literature pertaining to this subject has perhaps made the method generally known. Unless, therefore, something connected with the manipulation deterred, the practice should obtain generally if not universally. The evident disinclination on the part of farmers to adopt it is perhaps largely due to the imagined difficulty of heating water to a definite degree, measured by a thermometer. Of course, trial would generally dispel the illusion.

An efficient treatment, somewhat

simpler, not involving the use of any apparatus or appliance that the farmer is not in contact with every day, would doubtless be more generally adopted by the conservative farmers and perhaps be more acceptable also to the progressive agriculturist.

Potassium Sulphide an Efficient Fungicide.

Such an improved treatment is doubtless to be found in the use of potassium sulphide (liver of sulphur), first used for this purpose in 1890 by Mr. Swingle and myself. The experiments have been repeated since by very few persons, so far as I know. I took the opportunity, during the season just past, to carry out some new experiments, having in mind, above all, the desirability of a better method of application of this fungicide. At the same time I have made some comparisons of the efficiency of the following: Potassium sulphide, iron chloride and copper sulphate.

A summary tabulation of the results by treatments varying from ten minutes to two hours, and with 5 per cent., 3 per cent. and 1 per cent. solutions, is as follows:

Comparison of smut percentages in the crop of oats from seed treated with various solutions of three fungicides:

Fungicide.	5 p. ct.	3 p. ct.	1 p. ct.	Av.
Potassium sulphide..	0.22	0.80	1.80	1.00
Iron chloride.....	3.45	3.58	12.42	6.18
Copper sulphate.....	0.74	0.58		0.65
Seed untreated				17.71

It is noticed that while potassium sulphide is a satisfactory fungicide, the iron chloride is much inferior, though, of course, materially reducing the quantity of smut; and copper sulphate is the most efficient of the three. But the use of the latter fungicide injured the seed very much; in case of some of the plots a yield less than one-eighth of an average crop was obtained. These

results are in accord with those reported by all experimenters.. Copper sulphate is, therefore, to be most emphatically condemned. The germination of the seed and character of the crop were entirely satisfactory in case of treatments with potassium sulphide and iron chloride.

Percentage Solution and Time of Immersion.

A solution, to be efficient, need not be stronger than 5 per cent. nor weaker than 3 per cent., as indicated by the limited experiments. The time of immersion need not exceed one hour, and may perhaps satisfactorily continue but half an hour.

Here is given a portion of the tabulation, to illustrate the statements made:

Percentage of smut in the crop of oats from seed treated with potassium sulphide:

Time of immersion.	5 pr. ct. solut'n.	3 pr. ct. solut'n.	1 pr. ct. solut'n.
Two hours.....	0.44	0.32	0.78
One hour.....	0.50	0.60	1.95
Thirty minutes.....	0.02	0.60	1.87
Ten minutes.....	0.11	1.12	2.50
Smut from untreated seed.....			17.71

Percentage of smut in the crop of oats from seed treated with iron chloride:

Time of immersion.	5 pr. ct. solut'n.	3 pr. ct. solut'n.	1 pr. ct. solut'n.
Two hours.....	0.02	0.83	6.06
One hour.....	0.94	0.33	7.55
Thirty minutes.....	1.73	1.80	11.88
Ten minutes.....	1.10	6.81	19.24
Smut from untreated seed.....			17.71

The variation in the results is greater than would be anticipated, but larger plots and repetitions will doubtless eliminate such irregularities. The superiority of the potassium sulphide over the iron chloride treatment is quite marked. With it even a 1 per cent. solution and an immersion of two hours would, as a farmer would say, "practically destroy the smut."

Method of Application.

The treatment recommended in 1890 proved unsatisfactory, because of the difficulty of drying the grain

after a prolonged immersion. But the absorption of water during one or two hours is not large in amount and the difficulty of drying the seed is not great, provided one has a floor space of suitable area. The seed may be several inches deep and yet dry in a comparatively short time, if frequently turned with the shovel. A farmer would need no special instruction for applying this fungicide. A tub, a hogshead sawed in two, or any other wooden vessel could be used. The number of gallons of water desired (for example, 25 gallons) could be provided, and to this the required number of pounds (2 pounds for a 1 per cent. solution, twice as much for a 2 per cent. solution, three times as much for a 3 per cent. solution, and so on), would be added. In a few minutes, or perhaps an hour, if the quantity of the sulphide is large, the solution is ready for use. The seed should be stirred a few times while in the solution. The farmer's ingenuity will suggest the best method of making the immersion—whether to put the seed in a sack of coarse cloth, in a basket or frame covered with wire gauze, or directly in the watery solution; and whether the solution can be more conveniently poured off or removed by a faucet, etc.

Is Washing the Seed Desirable?

The suggestion has doubtless come to many or all, that thorough washing the seed would remove not only most of the smutted grains and smut mixed in the mass, but perhaps also the adhering smut spores, through which we know infection occurs in case of oat smut, barley smut and stinking smut of wheat. I have put the theory to the test so far as oats is concerned. The following table shows that no advantage results from such a prac-

tice, but on the contrary more smutted heads occur:

Percentage of smut in the crop from untreated seed and washed seed:

Seed untreated.....per cent..	16.74
Seed untreated but washed.....do.....	18.51

The above statement is based on a count of 17,757 heads, distributed in twenty-four different plots.

May Seed Be Washed After Treatment?

Were it allowable to wash seed after the treatment with a fungicide, the handling of the seed would be less disagreeable and the drying would be more easily accomplished. I have accordingly sought to decide the question experimentally, and the following tabulation shows the result:

Percentage of smut in the crop of oats when the seed is washed after treatment:

Fungicides and time of immersion.	5 per cent. solution.		3 per cent. solution.		1 per cent. solution.	
	Not washed.	Washed.	Not washed.	Washed.	Not washed.	Washed.
Potassium sulphide, 2 hours.	0.44	0.00	0.32	0.68	0.78	1.33
Potassium sulphide, 1 hour.	0.00	0.00	0.00	1.40	1.95	2.89
Iron chloride, 2 hours.....	0.02	6.46	0.83	6.23	6.06	13.11
Iron chloride, 1 hour.....	0.94	8.84	0.33	6.17	7.55	15.86
Copper sulphate, 1 hour.....	0.00	3.10	0.37	1.82		

It is evident that removing the adhering solution from the seed, instead of allowing it to dry without washing, makes the treatment less efficient. The result of all the tests, except the first, is uniform. The discrepancy in case of the potassium sulphide treated with the 5 per cent. solution, is unaccounted for and perhaps accidental. Washing the seed after treatment is, without doubt, undesirable.

Ceres-Pulver a Substitute for Ordinary Potassium Sulphide.

A coarsely, granular form of potassium sulphide, to which other in-

gredients are added, originated by J. L. Jensen, is now offered for sale in the market under the name of "Ceres-pulver." It is to be dissolved in water and the solution poured on the grain with an ordinary watering can used by florists. Two hundred grains dissolved in 25 liters of water (about — ounces to 6 gallons), suffices for 200 pounds of grain. In a single trial with the Ceres-pulver, I obtained the following result:

Percentage of smut in the crop of oats from seed treated with Ceres-pulver:

Seed treated with Ceres-pulver.....	1.80
Seed untreated	17.71

The large amount of smut in the crop of oats generally in this region, the present season, and especially in the plots planted for comparison (nearly 18 per cent.), gives the test, though a single one, considerable significance. As seen, the smut is less than 2 per cent.—a reduction that would be designated, in common parlance, as "practical destruction" of the smut. The method of treatment is simple, carried out with little labor, and I would recommend its adoption. Jensen directs that the grain be put on tight floors, the solution be poured on, with vigorous and repeated shoveling, so that all of the grain will come in contact with the solution. While drying, the mass should not be over six or eight inches deep and shoveled over at least twice daily. The seed is to be sowed not earlier than three days after the treatment, better four or five days, the initial germination in the meantime regarded as beneficial rather than otherwise.

Jensen's Method Applied to Other Fungicides.

The method of treatment recommended for the Ceres-pulver, when applied to the fungicides discussed above, does not seem to be so effect-

ual as the immersion for a period of time, though, as the annexed table shows, the amount of smut is materially reduced:

Percentage of smut in the crop of oats from seed treated according to Jensen's method., i. e., sprinkling with the solution:

Solution used.	5 pr. ct.	3 per ct.
Potassium sulphide	1.52	5.38
Iron chloride	4.88	10.12
Copper sulphate	1.60	0.85
Seed untreated, per cent	17.71	

HORTICULTURE AND HEALTH.

Address by William R. Lazenby, Vice-President, Section 1.

We live in era of reforms. At first, man was a reformer by primal necessity. He transformed or reformed nature to meet his bodily wants. His life was a mere struggle for existence.

In time he turned his eyes inward, and studied himself. He first dimly saw that there were higher ends and nobler purposes than mere sensual enjoyment. He slowly learned that his passions and appetites were created to serve and sustain, not to master and destroy.

Then turning his eyes outward, and scanning his relation to others, he found, not justice, much less love and good will, but necessity on the one hand, and advantage on the other, controlled the dealings of man with man. He met no recognition of the brotherhood of the human race. But progress is a law of our being, and we have now reached a point where ethical laws are being applied to practical life.

What the true, genuine reform spirit of our age is seeking to establish is the equality of human rights; an equality that disregards all disparities of race, sex, or color, of strength, knowledge, or creed; an equality that is plainly and tersely

expressed in the Declaration of Independence:

"We hold these truths to be self-evident: that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness."

As a people we may be selfish, short-sighted, and sinful, yet there is a strong undercurrent of moral obligation to live for the highest good of humanity, to co-operate with that "power which makes for righteousness."

Through all the folly and evils of our time there comes to every discerning ear a voice which speaks to us in no uncertain tone. Its message is this: teach the child and you will not be obliged to hang the man; find the vagrant orphan a home, and teach him a useful trade, and you will not have to punish him as a thief, or watch him as a criminal; furnish work to all who need it, and there will be few to support as tramps, paupers, and parasites; remove temptation from the path of the weak, and you will not be obliged to punish them for having stumbled and fallen; it is better to counsel than to condemn—better to lift up than to crush down—better to be shielded by love and gratitude than to be protected by soldiers and police. Thus testifies the moral genius of our age. Let us try to understand and heed it.

In this spirit, and with no little hesitation, I present a few thoughts on "Horticulture and Health."

Ours is an eminently practical age. The energy of our people is mainly expended in the production, manufacture, and distribution of articles that nourish the body, gratify the senses, or in some way contribute to the comfort and convenience of mankind.

Mind is steadily dominating matter, and this extension of the sovereignty of man over the material forces of the earth we call civilization.

The art of horticulture consists primarily in transforming by means of cultivation, crude and worthless materials into substances valuable as food products, or useful in ministering to our love of the beautiful. This raw material is furnished by the soil, and such substances as may be added thereto, together with certain elements of the air.

Gardening and horticulture, like farming and agriculture, are synonymous terms. We should remember, however, that the full scope of the meaning of the word is not determined by its derivation. This must be sought in its general use and common application. By this standard horticulture readily separates itself into four great divisions, each of which may be many times subdivided.

These principal divisions are:

- I. Pomology, or fruit culture.
- II. Olericulture, or vegetable gardening.
- III. Floriculture.
- IV. Landscape-horticulture.

The horticulturist, as he learns that the control of these laws is largely in his own hands, becomes an enthusiastic student and investigator, and can scarcely fail to develop a love for rural life—a love that is deep and abiding. Horticulture may justly rank as a science, as well as an art. Not to speak of the science of the propagation of plants, or the science of tillage, the great fundamental principles of evolution are exemplified in horticulture as nowhere else. Over 6,000 species of plants are cultivated by the horticulturist, and these have produced almost an infinite number of distinct forms.

In discussing the relation that horticulture bears to health, not physical health alone, but intellectual and spiritual health, have been considered. In like manner, the products of horticulture, as well as horticulture as a vocation or recreation, are taken into account. First, let us consider the effects of the use of our common garden and orchard products, as a part of an every-day diet.

There is a great deal of talk about health and diet that is equally foolish and hurtful—foolish because it subserves no good end, and hurtful because it tends to fortify the pernicious idea that our bodies are in such wretched condition as to need constant tinkering, and that some sort of self-medication is a positive duty.

So when one eats freely of fruits, he does not feel justified in simply saying he does so because he finds them agreeable, he likes and craves them, but is constrained to look wise and solemnly observe that "fruits are very healthy." Some even go so far as the German prince, and have for each bodily ailment a different variety of fruit. The prince said, "Whenever I meet with any misfortune or affliction, and am disposed to give way to my grief, I order a young goose nicely roasted, and eat as much thereof as I can: I always find that I rise from the table far less unhappy." Let us banish the idea of making a drug store of our fruit-gardens and orchards, and cease looking upon the family fruit-basket as a sort of homœopathic pill box!

The best results possible from the dietetic use of fruits and vegetables come from eating those that are fresh, healthy and properly matured, and which have been produced by our own skill and industry.

I am dwelling too long upon the

relations of the products of horticulture to health.

Let us consider how horticulture as a vocation stands related to the physical, intellectual and moral well-being of mankind. In order to maintain physical strength and vigor, at least four things are needful. These are pure air, nutritious food, unbroken sleep and muscular exercise.

That vocation which comes the nearest to supplying these requisites of good health can scarcely be other than a desirable one. Judged by this standard, horticulture stands at the very head of the list. Its quiet, its segregation from strife and jealous rivalry, its unequaled opportunities for nature study, make it at once attractive and healthful. Blessed is he who works in greenhouse, garden or orchard. As a rule, his day's exertion ends with the evening twilight, and he rises each morning with his physical energies renewed for fresh activity. To him is given that full measure of health only vouchsafed to those who spend most of their waking hours in the free, pure air, and renovating sunshine of the open country.

Health is not only wealth, but happiness, and the superior advantages of horticulture as a healthful vocation cannot be too strongly urged.

I shall have little to say regarding the relation of horticulture to intellectual health. Any true knowledge of the art or practice must be based upon science.

The horticulturist stands face to face with problems which require for their solution the amplest knowledge of nature's laws, the fullest command of science, and the best efforts of the human intellect. In this art study and mental acquisition, together with a habit of observation and reflection, are equally essential

and serviceable. However it may be with others, the horticulturist imperatively needs a knowledge of the character and constitution of the soil he tills, and the plants he cultivates, and the laws which govern their relations to each other.

Geology, chemistry and botany are the sciences which unlock for him the secrets of nature, and a knowledge of these is among the most vitally urgent of his needs.

Horticulture is an intellectual pursuit, and in its practice the strongest minds may find scope for profitable employment. The one who chooses this profession must keep his mind open and his mental faculties alert by constant observation and study. Horticulture is esteemed by all, because every useful vocation is respected in proportion to the measure of intellect it requires and rewards, and never can rise above this level.

The relation of horticulture to moral and spiritual health deserves a more extended consideration. The horticulturist deals directly with nature, and finds little or no temptation to juggle or stoop to trickery. "Whatsoever a man soweth, that shall be also reap," is immediately and palpably true in his case. Nature never has and never can be cheated.

The horticulturist, acting as a horticulturist, soon comes to realize that his success depends upon absolute verity, and he is not likely to be lured from the straight path of integrity and righteousness. When he goes into the markets and becomes a trader he is subjected to the same temptations as others, and may be enticed into some of the many devious ways of rascality. The whole tendency of his vocation, however, conduces most directly to a reverence for honesty and truth. It is likewise conducive to a genuine

independence and thorough manliness of character.

The horticulturist is not obliged to swallow any creed, support any party, or defer to any prejudice, in order to successfully follow his calling.

Horticulture is nature's best interpreter, and through this art the blinded eyes may be opened, the dormant æsthetic powers awakened and the heart made ready for a just appreciation of the beautiful. It is well to bring art into our homes, to adorn and decorate them with painting and sculpture; but we must not forget that the sense of beauty must be cultivated before the treasures of art can be made our own. If I were called upon to point out one of the most serious weaknesses in our modern system of education, I should answer, "Its failure to accustom the eyes of childhood and youth to the beautiful in nature." The beginning of all true education should be a love of nature, and nature-study ought to be the dominant note in every educational system.

It is a part of my social creed that there need be, and should be, no paupers who are not infantile, imbecile or disabled. Yet the world is full of men and women doing nothing, mainly because they don't know how to do anything. To correct this, youth should be a season of instruction in some trade or useful art, as well as in letters and various sciences. There should be a blending of labor with study, of training with teaching, so as to preserve health of body and vigorous activity of mind.

The pupil or student should be enabled to nearly or quite make his way through high school, academy and college, and go forth qualified to face adversity and maintain a healthful independence. One step toward the accomplishment of this desired end would be the introduc-

tion into our country schools of manual training in horticulture. The land required could be easily secured, and the necessary equipment in the way of tools, seeds, etc., would not be expensive.

The work undertaken in these training schools should embrace the cultivation of fruits, vegetables, flowers, shrubs, and trees. In connection with the above the various operations of propagating plants by seeds, cuttings, budding, grafting, etc., should be thoroughly taught. The collection and planting of weeds, the breeding of the more common injurious insects, and the use of remedies, the study of bees and useful birds, a practical acquaintance with our native trees and shrubs, and other similar subjects, might form a part of the instruction and training.

Horticulture may never become a universal panacea for destitution and crime, yet I have a joyful trust that thousands will be awakened by it to a larger and nobler conception of the true mission of labor, and by its practice, along the path of simple, honest, persistent work, life may be made easier, and men and women healthier and happier.

Townshend Society.

The Townshend Society is at present the most flourishing literary society at the University. Having attended the meetings and knowing the condition of the other societies, we can make this statement with all due respect to the other societies.

The program for October 23 was devoted to "The Farmer in Politics." The following was the program:

Present Distribution of Wealth in the United States.—C. W. Burkett.

Where are the Dependent Classes?

—John F. Cunningham.

The Farmer as a Citizen.—Prof. W. D. Gibbs.

The Farmer in Politics.—C. B. Stewart.

Debate.—Affirmative, Britton and Waid; negative, Gilmore and Loomis.

Program for October 30:

Declamation.—Dallas.

Essay.—Manville.

Current Events.—Duncan.

Story.—McClelland.

Debate.—Affirmative, Allpeter and Whipple; negative, Alvord and Aten.

Modern Cidermaking.

A correspondent from Grand Rapids, Mich., tells in the Chicago Record of the ways and means of modern cider-making. The apple crop this year is unprecedented. The trees are weighted down with fruit as they never have been before, and with a tremendous surplus of apples on hand thousands of bushels are being converted into cider.

The modern cider mill is constructed with the same ideas of economy in labor and strength that enter into other departments of the world's life. No longer is hand power used, and it is rarely that the horse treadmill will be found as the motor power. Steam from an engine which at other seasons of the year would be used for a threshing machine or a small farm sawmill furnishes the power, and practically all that the cider-maker has to do is to "boss" the job. In the larger mills the apples are thrown by the wagon load into a big box outside and are carried to the floor above by means of an endless belt which dumps them into the grinder, the belt and grinder both being worked by steam. From the grinder the pumice, ground much finer than in the old way, drops into the press. The press is built on the same general principles as it was in the olden times, but on different lines. There is a long platform with the

tank for the cider underneath. On the platform is a heavy truck on wheels, traveling along steel rails. The track has a slatted bottom and is covered with cider cloth, a heavy quality of cotton goods. The pumice drops down from the grinder upon the truck, and when enough has accumulated a slatted cover is put on with another cider cloth and more pumice is deposited. This is repeated until the pile has grown four or five feet, with alternate layers of slats, cider cloth and pumice. The truck is shoved over to the press proper, the top pieces are put in place, and the steam is turned on the screws for the final pressure. The screws work slowly so that the juice will be gradually extracted instead of breaking through the cloths, but the cider comes out in torrents, nevertheless, and it flows into the gutters around the platform and into the tank beneath, where it is strained through a covering cloth. When the cider is to be put into barrels, the engine is again set in motion, and it is pumped out, with a register on the pump to show the quantity passing through. A good-sized cider mill of modern construction can turn out from sixty to 100 barrels of cider a day, and with less labor than the old-time cider-maker produced his single barrel.

The cider is often made on commission or for custom trade, the farmer bringing in his own apples and paying to have them made up. The charge is usually about 50 cents a barrel. Large quantities are made up, however, by the cider man for his own trade, he buying the apples outright and assuming all risks. Cider sells for from 5 to 8 cents a gallon in years when apples are abundant, but in years of apple scarcity the price will run up to two or three times those figures. But, regardless of price, many city men must have their barrel of cider in the cellar for winter consumption, and cider is often shipped to distant points in the far West and to the South for men who formerly lived in the apple regions and who have not

forgotten their fondness for the golden fluid. But all the cider manufactured is not used as a beverage. Barrels and barrels of it are made into vinegar. The process of making vinegar is simplicity itself. The cider is simply left in the barrel in a warm spot and allowed to ferment. First it becomes hard cider, and with time it grows harder and harder until it can no longer be drunk at all; in a year it is vinegar of the sharpest kind. The vinegar-making process is accelerated somewhat by putting into the barrel a few spoonfuls of "mother" from a barrel that is already vinegar, but the "mother" will form of its own accord if the cider be left. Yeast is sometimes added to the fresh cider to hasten the fermentation, but yeast does no good and does not expedite matters if it is added late in the process. There are artificial processes for hurrying, but nature works fast enough in most cases and produces a better article. Like wine, vinegar improves with age—improves in the sense that it becomes more acid.

At the larger cider mills cider is not the only product. Evaporated apples, taking the place of the dried apples of our grandmothers, are an important item in production, and so are apple jelly, boiled cider and apple butter. For evaporated apples the better quality of apples are chosen, and they are pared and sliced by machinery. In paring the apples are stuck on a revolving fork, and eccentrics carry them against the knife blades; the peel is removed in a long strip, beginning with the stem and ending with the flower end. The core is removed at the same time, and the pared and cored apples pass to girls, who trim up the ends and remove any bits of skin that may remain. The paring machine is worked by hand in some mills, but by steam in the larger institutions. From the paring table the apple passes to the slicing machine. It is fed into a box like the top of a coffee mill, with numerous other pared apples, and is carried by a grooved roller

against the knives, which are arranged one above the other, and just far enough apart to give the slices the proper thickness. The sliced apples are then sent to the evaporating room, which has a floor of slats, with a big box stove beneath, burning wood. The evaporating floor is covered during the day, and at night the fire is built, the room is tightly closed, and in the morning the dried apples, not crisp like crackers, but of a leathery condition, are ready for packing in barrels and boxes. The apple skins and cores are carefully preserved, dried to a crisp, and are sold to manufacturers of jelly and other commodities. In making apple jelly the cider is pumped from the tank to the evaporating pans. The pan is a long, wooden box with a cover, and divided in the center by a partition containing steam pipes. The cider flows in a steady stream in at one end of the box, flows slowly to the other end, and around the end of the partition and back. The pipes are kept hot by steam from the boiler, and by the time the cider has reached the outlet it has been greatly diminished in quantity and is jelly. It is then run into crocks and jars for the market. The jelly is not quite up to the home-made article in clearness and color, but it has all of the other qualities. In making boiled cider the same pan is used, but not so much heat is applied to the pipes, reducing the evaporation. For apple butter big kettles are used with steam-pipe heat, and the mixture is carefully looked after and the spices are put in according to an established formula.

The early apples do not make the best cider—it is thin and watery and lacks flavor. The apples that ripen the latter part of September—the winter apples—make the kind of cider that is put up for winter consumption and into the cellars of cider lovers. Some people are as particular in selecting the apples for cider as they would be in choosing apples for family use. Often city men will buy a load of choice Baldwins or other standard

variety of apples, taking pains to have them carefully selected against rot or worm holes, and send them to the mill to be made up for their own use, paying the stipulated fee for having the work done. They are not only particular in selecting the apples, but they look carefully after the barrel in which it is to be stored. Whisky barrels are usually preferred for cider, but brandy and alcohol barrels are also desirable; but a barrel once used for cider is rarely used a second time, and even more rarely are new barrels made for it. The cider is often "fixed" against too rapid souring by the addition of acids and chemicals, which in a manner suspends fermentation when the cider has passed the "just-right" stage. These chemicals are not necessarily harmful in the quantities used, but even when "fixed" the process of fermentation is not stopped, but only delayed, and unless kept in a cool place the cider will get "hard" long before the winter is ended. P. FARMER.

Dairy School.

The third session of the winter course in Dairying opens January 6, 1897, and continues ten weeks. It is designed especially for those who are desirous of mastering the art of butter and cheese making, or who wish to become fitted for the position of manager or superintendent of a creamery or cheese factory. It is established to meet the wants of those who have neither the time nor the means to take the longer courses of study of the College of Agriculture. It is a practical course in dairy husbandry for the farmer, his son or daughter. There are hundreds of persons in Ohio who could materially increase their earning capacity by taking this course. The total fees are \$15.

Butter making, cheese making and Pasteurizing milk will be taught.

The greater share of the time will be given to the laboratory or dairy

room practice. This will comprise the testing of milk as to purity and content of butter fat, by the use of Lactometers and the Babcock Tester; the use and care of centrifugal separators and other dairy devices; the making of butter and cheese and Pasteurizing milk by the most improved methods; in short, all the essential operations of creamery, factory and home dairy management will be repeatedly performed under the guidance and direction of competent instructors.

The laboratory or dairy room practice will be supplemented by lectures and recitations upon the subjects of breeding, feeding, selecting, and judging of dairy stock; the diseases of the cow; the chemistry of milk; the effect of bacteria and other agents upon milk and its product; the care of boilers and engines, and similar subjects.

It will be the aim throughout to make all of the instruction equally thorough and practical.

The following schedule of studies gives concisely and briefly an outline of the work:

Dairy Farming.—Two hours each week. Lectures and recitations on breeds, breeding, feeding, selection and judging of dairy stock; equipment and management of dairy farms. Prof. T. F. Hunt.

Butter and Cheese Making.—Four half days each week. Laboratory practice in running separator, churning, working butter, making cheese, Pasteurizing milk, milk testing, etc. Profs. H. J. Noyes and W. D. Gibbs.

Butter and Cheese Making.—Two hours each week. Lectures and recitations. Profs. T. F. Hunt and H. J. Noyes.

Milk Chemistry and Milk Testing.—Two hours each week. Lectures and laboratory practice. Prof. H. A. Weber.

Bacteria in their relation to Milk, Butter and Cheese.—Two hours each week. Lectures and laboratory practice. Prof. A. M. Bleile.

Diseases of the Cow.—Three hours each week for six weeks. Dr. D. S. White.

Care of the Boiler and Engine.—One lecture each week during six weeks. Prof. W. T. Magruder.

ADVICE TO FARMERS.

How to Market Their Crops to the Best Advantage.



H. H. CARR.

Readers of history will remember that the early colonists began the foundations of this government by making a vigorous kick against unjust taxation. They will remember how the tea boxes were smashed open and kicked overboard into the bay because of the stamp act. Protests against unjust taxation led to the Revolution and the Declaration of Independence. Nearly every step in the great progress of the people of this country has been the result of a stand taken against some imposition. Through all this progress the main stay of the nation, whether in peace or in war, has been its farming classes. They have supplied its cities with fresh manhood, its armies with the bravest soldiers under the sun. They have pushed forward over bleak prairies and made it profitable to build railroads. They

have done little kicking. Farmers are too widely scattered to band together in labor unions. The Patrons and the Grange have their place; they have added something to social enjoyments. The demands of the present age are for practical results—in a word, better profits for farmers. The time was when farmers had greater returns. Land was less dear, crops grew with less care; prices were more than double those of the past ten years. Then it was not necessary to stop the leaks. A farm bought from the government quickly paid for itself if the owner was rugged and put in sixteen hours a day. Now it is different. Land is more valuable. It requires rotation of crops and constant enriching to keep up its producing qualities. The farmer should live better than before because everybody else does. His farm machinery costs more.

But more than all this, the producer has to face overproduction. New grain areas have been opened up. Our own great northwest states were hardly on the map as producers twenty years ago. Now the sun shines on no territory on God's earth so productive. Argentine has upset the calculations of the world by a few years' remarkable production of wheat and corn. Importing countries have become indifferent buyers except as a crop shortage like that of the present season sets them buying for the future. No intelligent farmer needs to be told that over-production results in low prices. They have had several years of practical experience in this direction. After months of hard labor, after risks of weather, after seeding and harvesting and threshing, they have hauled their grain to the station only to find that it barely covered the cost of land rent (or interest), the wear and tear on machinery, the hire of help, the feed of horses, to say nothing of the labor of the owner or renter of the farm.

It is a common error to think farmers are getting rich because they have improved machinery and raise crops by modern methods. It is true the cradle and the flail and the toll-gate are things of the past. The old hand-rake reaper and old double-shovel plow departed several years ago. The gang and steam plows, the self-binding harvesters and the steam threshers are common means of farming now. The mechanical age has done much to save the back of the farmer. It may be that the electrical age will do still more. But the head work must still be done by the head; nothing can take the place of brains.

This brings us to the remedy for a great burden resting on producers. Farmers raise crops by modern methods. They are fifty years behind in marketing methods. In the lifetime during which the country has been so cut by railroads that the farmer is seldom out of hearing of a locomotive, while the land has been strung by telegraph wires, while great trading centers like Chicago have built up perfect systems of warehouses, quick methods of lake shipment, official systems of weights and State inspection of all grain and produce—while these strides have been made, the farmer has gone on retailing his grain to a buyer at his home station. The country buyer attends to the weights, tells the farmer what quality his grain is, tells him what price he (the grain dealer) can afford to make on it. The farmer can take what is offered, or he can take his wagon load home again over miles of bad roads. Is this a fit marketing of a crop raised by the improved methods of today?

For five years our house has asked this question of farmers. For as many years, in season and out of season, through tons of printed matter, through personal appeals and through talks to farmers gathered at shipping points, we have attempted to answer the question. Early in the discussion

we took the ground that the country grain buyer, except in certain localities, is an unnecessary middleman between the farm and the central markets of the world. There was a time when he was needed. He is not now. When farm prices were very high and railroad systems less perfect, farmers could afford to pay the man at the station a tax. They cannot now, with wheat at 50c; the $2\frac{1}{2}$ c which the country buyer may easily claim is 5 per cent. of the full value of the grain. With corn at 20c, the 2c which drops to the country shipper for his little trouble is 10 per cent. on the wagon load, and in the course of the season becomes 10 per cent. on all the farm produces. If a State or government were to impose such a tax for any purpose there would be revolution in thirty days. But this has been going on at least thirty years since the necessity for such middlemen ceased.

For the purpose of prosecuting this work, our old established house in the Chicago trade was converted into the Farmers' Commission House. The sole object has been to carry on a campaign of education looking to direct farmers' shipments of grain to Chicago. After months of distribution of printed circulars advocating the saving of the country shippers' profits, and reams of circulars giving instructions about direct shipments, the plan began to take root. First experiments in car lot shipments to Chicago were followed by honest letters from farmers, giving accounts of their savings over the old method of selling grain by the wagon load at the home station. Then the idea began to spread. One independent shipper encouraged others. Now there are numerous shipping points over ten States tributary to Chicago, where shipments are almost exclusively by farmers, the total reaching thousands of thinking farmers doing their own shipping to the largest competitive market in the world. Here their car

loads come in contact with the buying agents for millers, brewers, sugar refiners, oat meal mills, seed crushers, etc. The best possible prices must be the result of such competitive buying. There is no one-man price on a wagon load about doing business this way.

Direct shipments have progressed best with young men; they like the independence it gives them; they like to get in touch with Chicago methods; they are quick to figure the increased profits over the old way of marketing grain. They know that the money which builds fine homes, builds local elevators, establishes private banks, all the property of the country shipper, may be utilized to lift farm mortgages, to buy home luxuries, to afford travel and other enjoyable things in life. So the young men are becoming direct shippers of all the farm produces.

But the reader may ask, Is it worth while? Take some figures. Suppose by a little head work the individual farmer saves \$1, fifty farmers in a good shipping community \$50, ten shipping points in a county \$500, one hundred counties in a State \$50,000, twenty States in the Mississippi Valley \$1,000,000. But the very lowest saving, even on one shipment, may

be put at \$10. This would be \$500 for a shipping point, \$5,000 for a county, \$500,000 in the State and \$10,000,000 in the territory named. From piles of letters which would fill a freight car we have the farmers' own letters, stating that their savings for an ordinary season reach \$200 and \$300, according to the size of farms. Let us cut this to the bone. Say the individual saves \$100 in a season, it means \$5,000 for the good shipping community, \$50,000 for the shippers in each county, \$5,000,000 for the State, and \$100,000,000 for the farmers of the central States. Is it worth while? Is it unreasonable? It simply means a little head work, a little independence. The middleman and his tax must go, just as the toll-gate and the old style reaper had to go because no longer needed. The plan of direct farmers' shipments of grain we regard as the biggest money-saving proposition offered to farmers in a lifetime. Its adoption places marketing of grain on the same modern level with farming by improved machinery.

Full information will be mailed upon request.

Respectfully,
H. H. CARR & Co.,

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